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**Please read instructions before
installing device**



Solar Controller / Battery Charger User's Manual

Congratulations!

You have made an excellent choice by purchasing this high quality KORR PWM solar controller which has been manufactured to the highest standards of performance, quality and safety.

We want you to be completely satisfied with your purchase so this KORR solar controller is backed by our own 2 years warranty.

If you require technical help and support in regards to this product please call **(07) 3801 8332** or email info@korrlighting.com.au

Faulty product claims made within the 2 year time frame will be repaired or replaced free of charge provided that you have satisfactory proof of purchase (keep your receipt).

VERSION AND RATINGS

There are two standard versions of KORR PWM controllers

KOR12-10 / KOR12-10SL

Rated for 12V solar panel (Max. 25V)

Rated maximum output current of 10Amp

KOR12-15 / KOR12-15SL

Rated for 12V solar panel (Max. 25V)

Rated for maximum output current of 15Amp

To comply with the National Electric code (NEC), the current rating of the controller for solar charging must be equal or greater than 125% of the solar array's short current output (Isc), therefore, the maximum allowable solar array into these KORR solar controller for compliance with the NEC is:

KOR12-10 / KOR12-10SL: 8Amp Isc

KOR12-15 / KOR12-15SL: 12Amp Isc

WARNING

- Make sure you connect the red to the positive on the battery and the black to the negative on battery
- Please double check before you connect, connecting to wrong terminals may burn out the controller
- Confirm that the power wires are tightened to the correct torque to avoid excessive heating from a loose connection.
- Refer to battery specification, be very careful not to short circuit to the battery connections.
- Explosive battery gases can be present during charging. Be certain there is enough ventilation to release the gasses.

FEATURES AND ADVANTAGES

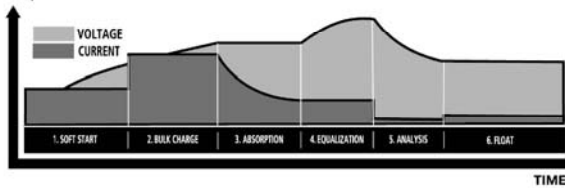
1/ Used with **industrial** class microchip



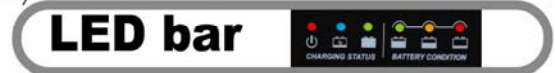
4/ The state of charge is represented visually in the large LCD



2/ The multi charging stage, with advanced PID for accurate control



5/ Easily read the battery condition via



3/ Friendly interface to be flexibly set the different battery type for AGM, Wet, Calcium and Gel battery



6/ Waterproof with epoxy resin



7/ Robust cable connection terminals

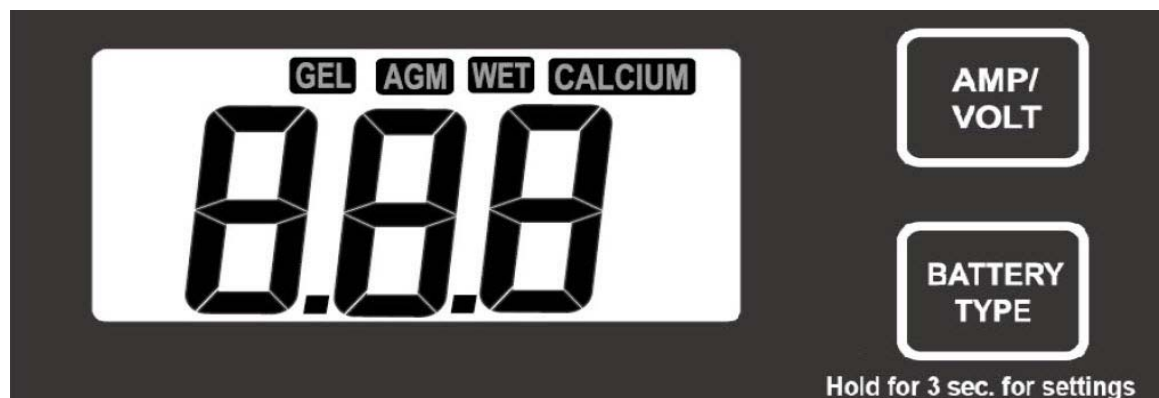
8/ Dimensions



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OPERATION - LCD DISPLAY

Please check your battery manufacturer's specifications to select correct battery type. The unit provides 4 battery types for selections: Gel, AGM, WET (conventional lead acid), and Calcium.



Press **BATTERY TYPE button** and hold for 3 seconds to go into your battery type selection mode, the battery type you select will be shown on the LCD meter, the default setting is AGM Battery; the controller will automatically memorize your battery type setting.

Caution: Incorrect battery type setting may damage your battery.

When the controller powers on, the unit will run self-qualify mode and automatically show below items on LCD before going into charging process

 Self-test starts, digital meter segments test

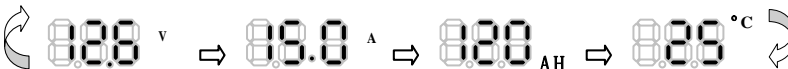
 Software version test

 Rated voltage and current test

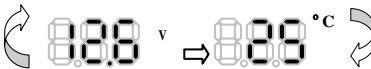
 External battery temperature sensor test (if connected)

After going into charging process, the LCD displays the charging statuses as below:
Press **VOLT / AMP button** in sequence, the LCD will display in turn with Battery Voltage, Charging Current, Charged capacity (Amp-hour) and Battery Temperature (if external temperature sensor connected)

Display in the day time-

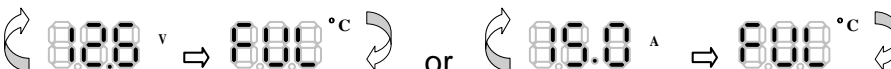


Display during the night-



Display when battery fully charged

Press **VOLT / AMP button** in sequence, the LCD will display in turn with Battery Voltage, Charging Current, if you do not press the button, the LCD will alternatively display the FUL and VOLT or FUL and AMP every 2 seconds



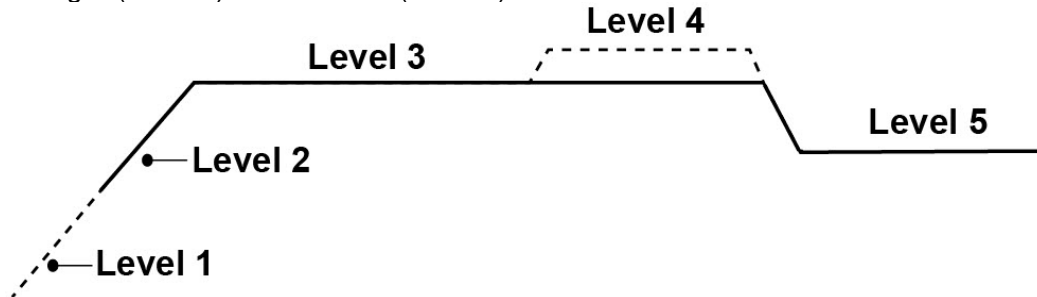
The **VOLT / AMP button** can be changed at any time during charging process.

The LCD also can be treated as an independent voltage meter or thermometer.
A voltage less than 11.5V Volts indicates that the battery is discharged and needs re-charging.

CHARGING STAGES

The unit has a 5 stage charging algorithm.

Soft Charge (Level 1) –Bulk Charge (Level 2)-Absorption charge (Level 3) – Equalizing Charge* (Level 4) - Float Mode (Level 5)



Soft Charge- When batteries suffer an over-discharge, the controller will softly ramps the battery voltage up to 10V.







Bulk Charge-Maximum current charging until batteries rise to Absorption level

Absorption Charge-Constant voltage charging and battery is over 85%.






Equalization Charge*-Only for WET battery or Calcium battery type, when the battery is deeply drained below 10V, it will automatically run this stage to bring the internal cells as an equal states and fully complement the loss of capacity.(Gel and AGM battery do not run Equalization charge)













Float Charge-Battery is fully charged and maintained at a safe level.
A fully charged battery has a voltage of more than 13.6 Volts.


OPERATION - L.E.D. INDICATION

The 6 LED's indicate the charging status and the battery condition						
	Red	Blue	Green	Green	Yellow	Red
Solar Power Present-No battery connected	ON	OFF	OFF	OFF	OFF	Flash
Soft charging	ON	Flash	OFF	OFF	OFF	ON
Bulk charging	ON	ON	OFF	Subject to battery voltage		
Absorption charging	ON	ON	OFF	ON	OFF	OFF
Equalization charging	ON	ON	OFF	ON	OFF	OFF
Float charging	ON	OFF	ON	OFF	OFF	OFF
Solar panel weak	Flash	OFF	OFF	Subject to battery voltage		
At night no charge	OFF	OFF	OFF	Subject to battery voltage		
Battery Voltage below 11.5V (+/-0.2V)	ON	ON	OFF	OFF	OFF	ON
Battery Voltage between 11.5V - 12.5V(+/-0.2V)	ON	ON	OFF	OFF	ON	OFF
Battery Voltage above 12.5V (+/-0.2V)	ON	ON	OFF	ON	OFF	OFF

ABNORMAL OPERATION MODE

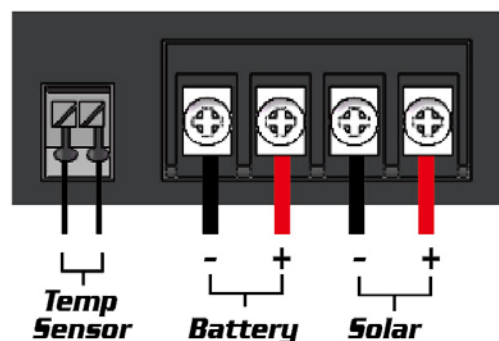
Solar panel abnormal mode	LCD display	LED indication	LCD backlight
Solar panel weak		 Flash	ON
Solar panel reverse connection		 Flash	Flash
Solar panel over voltage (> 26.5V)		 Flash	Flash

Battery abnormal mode	LCD display	LED indication	LCD backlight
Battery disconnected or less than 3.0V		 Flash  Flash  Flash	Flash
Battery reverse connection		 Flash	Flash
Battery over voltage than > 17.5V		 Flash	Flash
Battery temperature over 65C		 Flash  Flash  Flash	Flash

The solar controller abnormal mode	LCD display	LED indication	LCD backlight
The controller over temperature protection			Flash

OPTIONAL EXTERNAL DEVICE

The controller provides an optional devices (excludes in the packaging box).



Optional external Battery temperature sensor:

As an option, the unit provides a port to connect the external battery temperature sensor; if the external battery temperature sensor is connected, the unit will optimize the charging performance subjected to the battery temperature detected and also provide the battery over temperature protection, in some case, if battery over temperature occurs, the controller will automatically stop charging.

SPECIFICATIONS				
1	Electrical Parameters			
1-1	Rated solar panel amps for KOR12-10, KOR12-10SL	10	Max.	AMP
1-2	Rated solar panel amps for KOR12-15, KOR12-15SL	15	Max.	AMP
1-3	Normal input Solar cell array voltage	15-22		VDC
1-4	Max. solar cell array voltage (output has no load)	25	Max.	VDC
1-5	The controller lowest operating voltage (at solar or battery side)	8V	Min	VDC
1-6	Standby current consumption at night	5	Max	mA
1-7	Maximum voltage drop-Solar panel to battery	0.25	Max.	VDC
2	Charging characteristics			
2-1	Minimum battery start charging voltage	3	Min	VDC
2-2	Soft start charging voltage	3-10	+/-0.2	VDC
2-3	Soft start charging current (50% PWM duty)	Up to 15		AMP
2-4	Bulk charge voltage	10-14.0	+/-0.2	VDC
2-5	Absorption charging voltage at 25°C			
	--Gel type battery	14.1	+/-0.2	VDC
	--AGM type battery (default setting)	14.4	+/-0.2	VDC
	--WET type battery	14.7	+/-0.2	VDC
	--Calcium type battery	14.9	+/-0.2	VDC
2-6	Absorption transits to Equalizing or Float condition:			
	--Charging current drops to (for KOR12-10/SL)	0.5	+0.1	AMP
	--Charging current drops to (for KOR12-15/SL)	0.75	+0.1	AMP
	-- or Absorption charging timer timed out	4		Hour
2-7	Equalization charging active			
	--Only for WET or Calcium battery			
	--Battery voltage discharged to less than	10	+/-0.2	VDC
	--Automatic equalizing charging periodical	28		Day
2-8	Equalization charging voltage at 25°C	15.5	+/-0.2	VDC
2-9	Equalization charging timer timed out	2		Hour
2-10	Float charging voltage at 25°C	13.6	+/-0.2	VDC
2-11	Voltage control accuracy	+/- 1%		
2-12	Battery temperature compensation coefficient	-24		mV/°C
2-13	Temperature compensation range	-20~ +50		°C
3	Protection			
3-1	Against reverse polarity or short circuit at panel side			
3-2	Against reverse polarity or short circuit at battery side			
3-3	No reverse current from battery to solar at night			
3-4	Over temperature protection during charging	65		°C
3-5	Transient over voltage protection with TVS or varistor			
4	Electrical parts			
4-1	Input output terminal	M4 terminals		
4-2	Temperature sensor port (Press and Release type)	DA 250-350 2P		
5	Physical Parameters			
5-1	Controller material	Plastic, Standard ABS		
5-2	Power terminal maximum stranded wire size	#12 AWG stranded-3 mm ²		
5-3	Dimension L x W x H	130x102x25 (mm)		
5-4	IP grade (for KOR12-10, KOR12-15)	IP22		
	IP grade (for KOR12-10SL, KOR12-15SL)	IP66		
5-5	Net weight	Approx. 250g		
6	Environmental characteristics			
6-1	Operating temperature	-25 ~ 50°C		
6-2	Storage temperature	-40 ~ 85°C		
6-3	Operating Humidity range	100% no condensation		

FAQ

Q. Can I connect this solar panel to an existing Anderson plug on my camper / caravan?

A. Solar panel must connect directly to the battery - do not connect via Anderson plugs on camper trailer or caravan.

(These Anderson plugs may go through another controller which stops the panel charging your battery) in some cases you can connect to Anderson plug as long as it directly wired to battery.

Q. Why am I getting no power through my solar panel?

A. 1. All solar panels need to be connected to a battery to work.

2. Make sure all Anderson connectors are plugged in.

3. Make sure a wire has not been pulled out of the controller.

4. Please ensure solar panel is connected directly to a battery

(Not through any secondary controller / charger)

(Note: If reset of controller is needed, remove all wires from battery)

Q. Why am I not getting maximum amps per hour?

A. Taking into consideration on a perfect day (24-28 degrees) your panel will produce maximum amps per hour.

If your battery is over 80% full the controller automatically slows down the charge into the battery, this allows the battery to get 100% full.